

**BUCHAREST UNIVERSITY OF ECONOMIC STUDIES**

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*Doctoral School of Economic Informatics*

**BLOCKCHAIN, SOCIAL MEDIA & ARTIFICIAL  
INTELLIGENCE: THE TECHNOLOGICAL AND FINANCIAL  
REVOLUTION OF THE 21ST CENTURY**

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**KEYWORDS:** Artificial Intelligence; Blockchain; Social Media

## **SUMMARY**

This doctoral thesis explores the relationship between social media and the cryptocurrency market, in particular the relationship between Bitcoin and X (ex-Twitter). The research addresses three main questions: To what extent and through what mechanisms does sentiment expressed on social media influence Bitcoin price fluctuations? What is the effectiveness of predictive models based on Long Short-Term Memory (LSTM) architectures in predicting Bitcoin price evolution? How can a descriptive-predictive-prescriptive framework improve the understanding of the Bitcoin market?

To answer these questions, the study begins with an analysis of the existing literature, identifying the limitations of current approaches. The study also includes an analysis of public perception on the use of artificial intelligence in cryptocurrency price prediction. Using a Vector Autoregressive model, the research demonstrates the existence of a bidirectional relationship between sentiment expressed on X and Bitcoin price fluctuations. The research advances with the development of a predictive model based on the LSTM architecture, incorporating over 50 on-chain metrics and sentiment data. This research activity goes beyond the complexity of studies identified in the literature.

The main contribution of the thesis is the development of the Descriptive-Predictive-Prescriptive (DPP) framework, among the first in the field of cryptocurrencies. This framework integrates descriptive, predictive, and prescriptive analytics, providing a holistic perspective on the interaction between social media and the cryptocurrency market. The DPP framework combines social media sentiment analysis, historical price data, and on-chain metrics to provide a comprehensive understanding of market dynamics. It is further enhanced by the integration of large language models (LLMs) and the development of an agent-based framework, the Descriptive-Predictive-Prescriptive - Agentic Framework (DPP-AF). This evolution improves the quality of results, risk management, and decision-making.

The original contributions of the thesis are multiple and significant. The integration of a very large number of on-chain metrics (over 50) into the predictive models provides a more granular analysis of the factors influencing the Bitcoin price. Sentiment analysis techniques have been improved, using more advanced Machine Learning (ML) models than the lexicon-based approaches identified in the literature. A model based on the LSTM architecture has been developed that outperforms the benchmark models in predicting the Bitcoin price over different

time horizons. Finally, the proposed DPP framework integrates descriptive, predictive and prescriptive analyses into a coherent system. DPP-AF opens new perspectives, such as the integration of LLMs models and an Agent-based framework. Future directions are presented, such as extending the framework to other cryptocurrencies or other assets, and analyzing the long-term impact of using such tools on market efficiency.

In conclusion, this thesis provides useful tools for academia, investors, analysts, and regulators in navigating the complexity of the cryptocurrency ecosystem. Through its comprehensive and innovative approach, the research contributes to advancing knowledge at the intersection of social media, artificial intelligence, and emerging financial markets.